Magic Maps
User Manual

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Version 1.0

Preface

Unless your profession is sailing, soldiering, or surveying, you probably don't think of maps as simply describing geographical relations and geometrical proportions. If that were true, you would feel perfectly comfortable looking at a map where Canada hung below the United States, or Chile ran left to right, or Antarctica sat atop the globe. Even if the map's features were all correct, such a map would be disorienting to behold, like a fun-house mirror in the Louvre.

We all know that North is up, Antarctica is down, the U.S. looks like a shield, and Chile stands up like a stick. Perhaps it is biased to always put North on top and South on the bottom, but I prefer to look at the positive side of this tradition: maps are full of familiar shapes, and their features form a rich language for communicating information.

With Magic Maps, I have tried to make it easy to put this language to use with your own data. You can add points of interest or color areas based on whatever numbers you think might be interesting to look at. Or if facts bore you, you can color and label a map simply according to fancy. As with any language, the realm of possibility is defined by your experience and imagination.

Evan Miller

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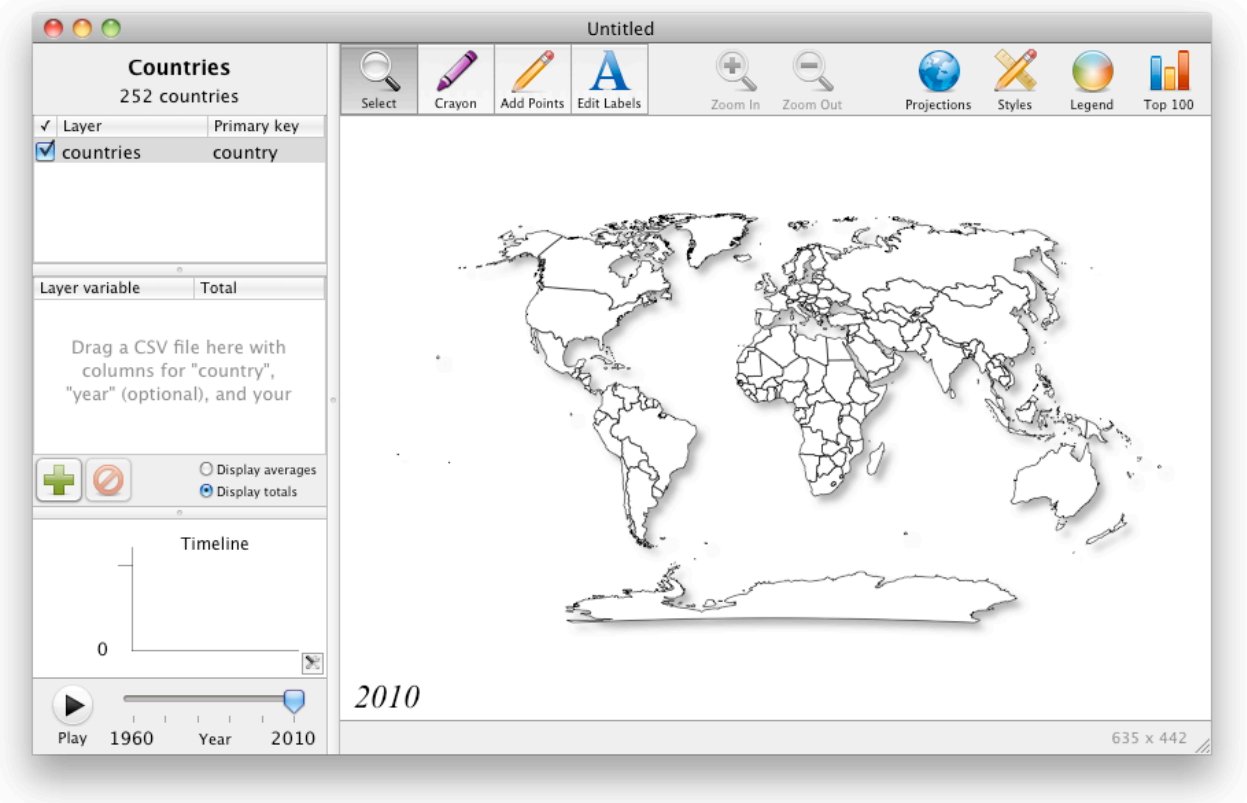
I. Introduction: The Magic Maps Interface

Magic Maps can be used for multiple purposes, and it is not necessary to learn everything about all of its features in order to start using it. This section provides a basic orientation to the Magic Maps interface.

Similar to word processors and spreadsheet programs, Magic Maps is document-oriented, and can have one or more documents open at once. Each saved document has the file extension `.magicmap` on your hard drive.

A document contains one or more *map layers*. A map layer is a set of related features, such as countries, states, or points. Each map layer has zero or more *variables*, which is just a bit of data associated with each feature (for example, its area or population).

We'll get to the details of layers and variables in a minute. In the meantime, we'll talk about the the document interface, which looks like this:

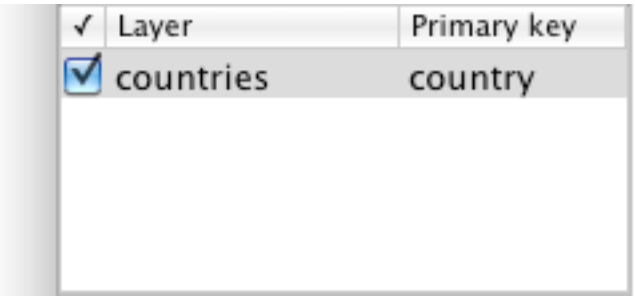


The interface can be divided into several components. We will cover them from top to bottom, left to right.

Top left: Selection bar

The selection bar displays information about the currently selected map layer. The first line, in bold, displays its name. The second line displays a summary of the current selection of features in this layer (e.g., “Brazil” or “14 countries”). If no features are selected, the number of features in the selected layer is displayed (e.g., “252 countries”).

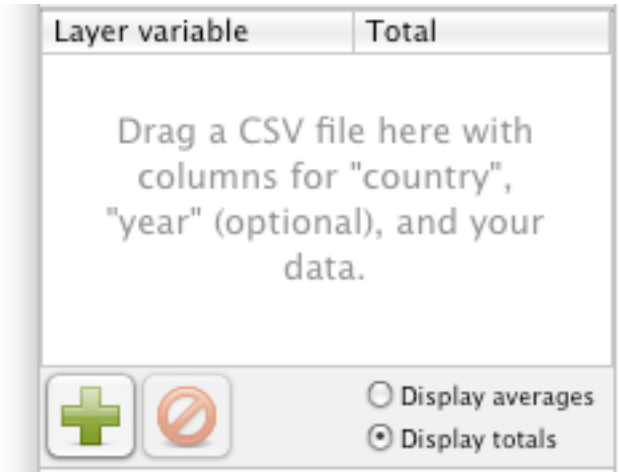
Upper left: Layer table



Below the selection bar is the layer table. The layer table contains a list of layers on the map. The currently selected layer on the map is highlighted in purple or gray in the layer table. The selected layer will appear above all the other layers on the map. Only one layer may be selected. To change the map’s selected layer, click the appropriate row on the layer table.

The checkbox indicates whether that layer is visible on the map. If a layer is selected but not checked, it appears on the map translucently. The primary key column is used for linking additional data sets, and is described in greater detail in Section IV.

Middle left: Variable table


Layer variable
Total
Drag a CSV file here with columns for "country", "year" (optional), and your data.
Display averages
Display totals

Below the layer table is the variable table. The variable table displays a list of variables associated with the currently selected layer. Selecting a variable in the variable table will display its information on the map and in the timeline view. Selecting multiple variables in the variable table will result in no information being displayed on the map or in the timeline view.

The column on the right displays aggregate numbers for each variable. If no features are selected, this column displays the aggregate figures across all features in the currently selected layer. If one or more features is selected, the column displays aggregate figures for the selected features.

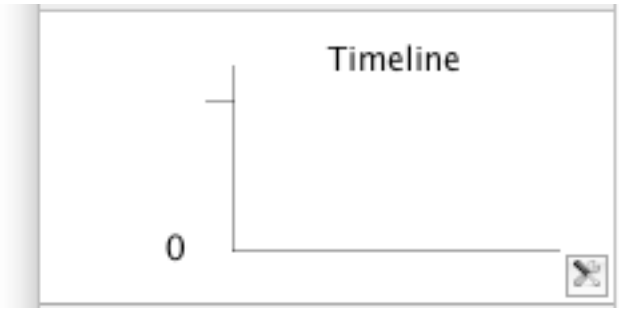
There are two aggregation functions available: average and sum. The aggregation function can be changed using the radio buttons on the bottom right. The aggregation function will apply to all variables; it is not possible to view the sum of one variable and the average of another variable simultaneously.

As the message in gray indicates, the layer variable functions as a drag-and-drop target for CSV files containing data for the currently selected layer.

A new variable can be created by clicking the green button.

An existing variable can be deleted by selecting it and clicking the red button.

Lower left: Timeline view

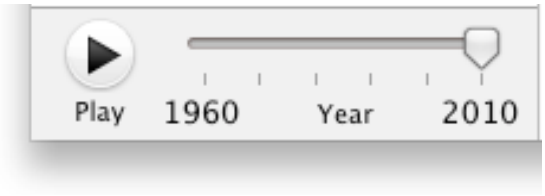


Below the variable table is the timeline view. The timeline view displays a time series of the currently selected variable for the currently selected features. The currently selected year is indicated with a black dot on the timeline. The currently selected year can be changed by using the controls or by clicking directly on the timeline.

When clicked, the configure button in the bottom right reveals a set of options for configuring the timeline, described below. These options can be hidden by clicking the button a second time.

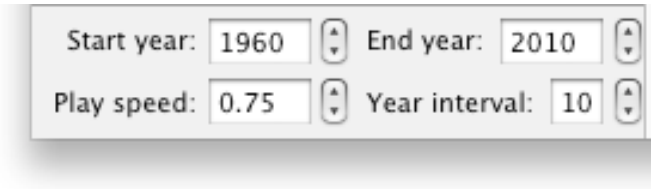
Bottom left: Timeline controls

Standard view:



In the standard view, the timeline controls display a slider bar for the currently selected year and a “Play” button, which, when clicked, automatically iterates through all of the years on the slider bar as if it were a movie.

Configuration view:



The configuration view appears when the configure button is clicked. The controls can be used to change the start and end year of the timeline, as well as the number of years between ticks. The play speed refers to the speed at which the “Play” button iterates through the years on the slider bar; the number refers to slider ticks per second (so larger numbers correspond to faster speeds).

Top: Toolbar

The toolbar at the top of the document window is divided into three groups of icons: tools, zoom, and inspectors.

Tools. On the left are four icons, representing the four tools available for manipulating a map: Select, Crayon, Add Points, and Edit Labels. Clicking tool’s icon will select the tool.

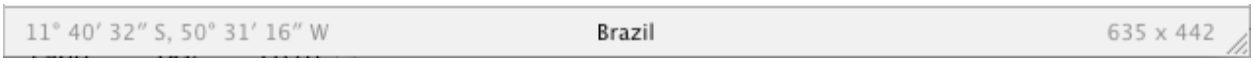
Zoom. In the middle are two icons for changing the zoom level of the map. Clicking “Zoom In” will zoom the map to the current selection of map features. Clicking “Zoom Out” will change the zoom level to the previous zoom level.

Inspectors. On the right are four icons that, when clicked, bring up an inspector window. The available inspectors are Projections, Styles, Legend, and Top 100. A fifth inspector, called Parameters, is available from the “Inspectors” menu.

Center: Map view

The large map view in the middle displays the map, as well as an optional year label in the bottom left. At the top of the map is an invisible text field, which can be clicked to add a title to the map.

Bottom: Status bar



The status bar at the bottom of the window displays three pieces of information:

- *Current geographic position:* The latitude and longitude associated with the current mouse position in the map view.

- *Current feature:* The feature associated with the current mouse position in the map view.

- *Map size in pixels:* The width and height of the current map view, in pixels.

In addition, the status bar has a resize handle on the far right, which can be used to resize the window.

* * *

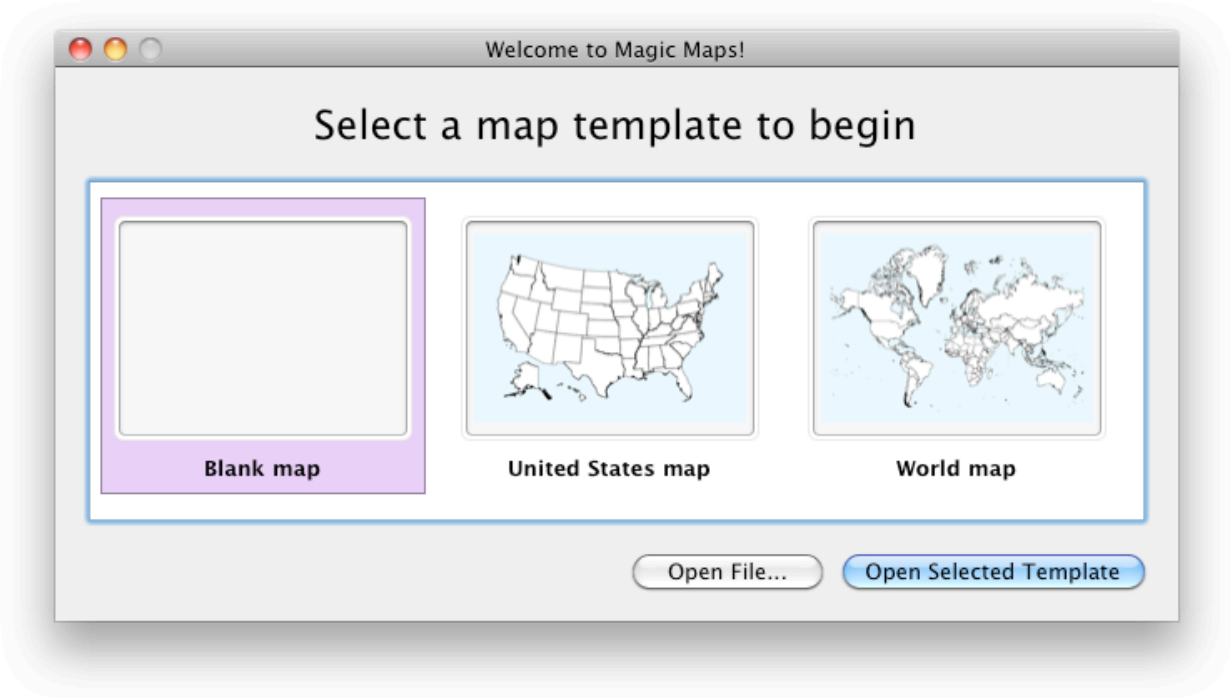
This concludes our tour of the Magic Maps document interface. In the next section, we will discuss how to start working with an appropriate map template —either a built-in template, or one downloaded from the Web. Section IV discusses how to import and work with data in Magic Maps; Section V describes how to give titles and labels to your maps; and Section VI describes how to customize a map's style and projection.

II. Setting Up A Map Layer

The first step in building a map is to choose or import a map layer which will contain the major features of the map. This section discusses how to go about it.

Using a built-in template

The easiest way to get started is to use one of the built-in map templates. When Magic Maps is opened, a template selection screen appears:



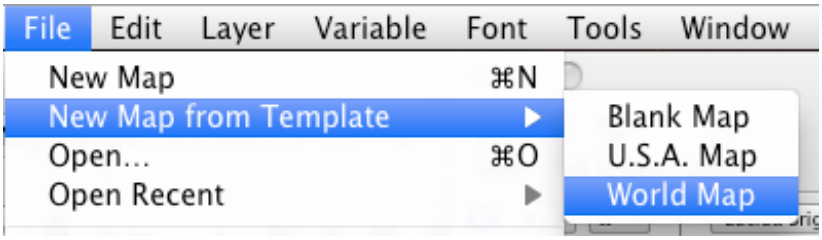
The three map templates are:

Blank Map. If you choose a blank map, it is necessary to import a map layer before doing anything else. (Importing a map layer is described below.)

United States map. The United States map template contains three layers: U.S. states, U.S. counties, and U.S. metropolitan areas. (After opening a new document with the U.S. map template, you are free to delete layers that you do not need.)

World map. The World map template contains a single layer with countries of the world and their political boundaries as of 2010.

It is always possible to open a new map with one of these templates from the File menu:



Importing a map layer

If the built-in templates do not suit your purposes, you will need to import a layer from a file on your hard drive. Magic Maps supports two data formats for importing map layer data: KML and Shapefile.

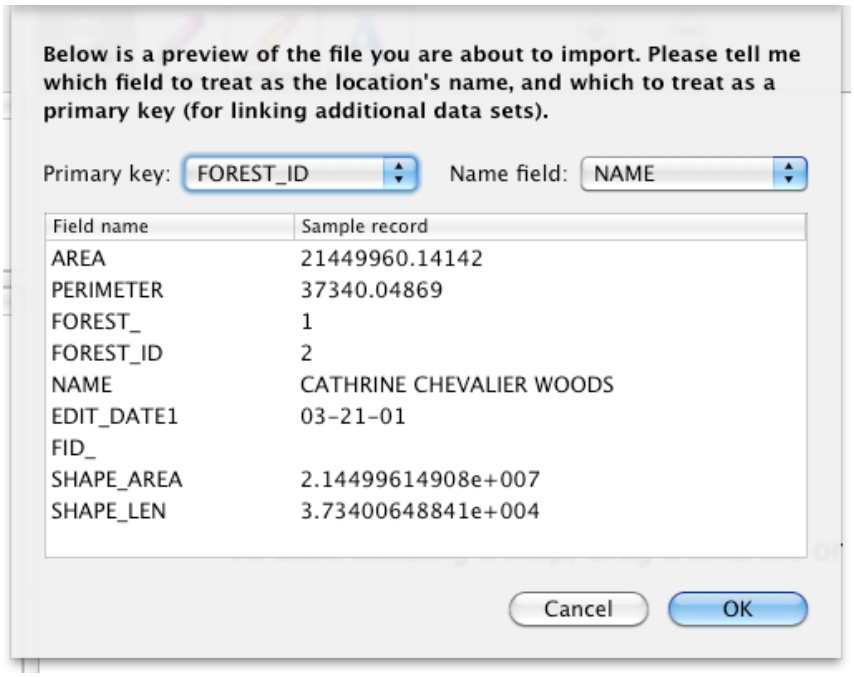
- *KML (Keyhole Markup Language).* KML is a variant of XML that is used by Google Earth. KML files have the file extension `.kml` or `.kmz`.

- *Shapefile.* The Shapefile format is actually a collection files in the same folder; one of these files has the extension `.shp`. Shapefile is used in the ESRI ArcGIS program, and is the most popular format among government agencies. Shapefiles are often distributed as ZIP files, which must be unzipped before importing the Shapefile into Magic Maps.

After Magic Maps has been installed, either data format can be opened simply by double-clicking the file, which will have one of these icons:

These files can also be imported into an existing document using the “Import Shapefile” and “Import KML” commands in the File menu.

In addition to information about the shapes of features, these files usually contain data columns that describe each feature's name and other attributes. When you import a KML file or a Shapefile, you will be presented with a dialog like this:


Below is a preview of the file you are about to import. Please tell me which field to treat as the location's name, and which to treat as a primary key (for linking additional data sets).
Primary key: FOREST_ID
Name field: NAME
Field name
Sample record
AREA 21449960.14142
PERIMETER 37340.04869
FOREST_ 1
FOREST_ID 2
NAME CATHRINE CHEVALIER WOODS
EDIT_DATE1 03-21-01
FID_
SHAPE_AREA 2.14499614908e+007
SHAPE_LEN 3.73400648841e+004
Cancel
OK

With the two pop-up menus at the top, you can choose the data column to treat as each feature's name, and a data column to treat as its primary key for linking additional data sets (primary keys are described in Section IV). In most cases, the defaults should work fine.

If you are importing a KML file and it contains multiple layers, a slightly more complex dialog will appear, asking you to perform the same task for multiple layers.

Tips on Finding High-Quality KML and Shapefiles

High-quality KML and Shapefiles for almost every imaginable map layer are available on the Internet. Unfortunately, *finding* the right map layer can be difficult, since search engines generally do not index geographic data.

The best source of Shapefiles is usually government websites. In the United States, all states and most counties have agency websites with links to data in Shapefile format, as do many cities.

University library websites often contain collections of Shapefiles. Another source of geographic data is GeoCommons, www.geocommons.com.

In the future, the Magic Maps website will contain a richer collection of map layer templates. In the meantime, it may take a little patience and sleuthing around to find the files that suit your purposes.

III. Working With Data

Before importing data onto your map, it is helpful to understand a few key concepts.

Key concepts

- *Map layer*: A map layer is a set of related features, such as countries, states, or points. The selected layer always appears on top, and optionally has labels and a drop shadow. Other layers can appear in order below the selected layer. There are four kinds of layers: data layers, selection layers, Smart Layers, and radius layers.
    - *Data layer*: A data layer is a map layer that has variables associated with each feature. For example, a county layer might have a variable for each county called “population.” Each data layer also has a primary key used for linking additional data.
        - *Primary key:* The primary key of a data layer is a string of text used to uniquely identify each feature in the layer. For example, the primary key might be a country’s name, or a standard two-letter code.
    - *Selection layer:* A selection layer is a map layer that contains a specific subset of features in a data layer.
    - *Smart Layer:* A Smart Layer is a map layer that contains a dynamic subset of features in a data layer. The subset is determined based on custom rules defined by the user; for example, a Smart Layer might contain only counties with population greater than 100,000.
    - *Radius layer:* A radius layer is a map layer that consists of geographic circles drawn around the features in another layer. For example, a radius layer might consist of 100 kilometer radii drawn around warehouse locations.
- *Variable:* A variable is information associated with each feature on data layer and contains either numeric or textual information. There are three kinds of variables: data variables, text variables, and computed variables.

- *Data variable:* A data variable is numeric information associated with each feature on a data layer (for example, population).

- *Text variable:* A text variable is textual information associated with each feature on a data layer (for example, the county's name).

- *Computed variable:* A computed variable is numeric information that is derived from one or more data variables or other computed variables. For example, a computed variable called "population density" might be a county's population divided by its area.

Importing data

There are three ways to import data into Magic Maps:

- *From the map layer file.* If you imported a map layer from a KML file or Shapefile, the data associated with the file will be automatically imported by Magic Maps. (In the case of Shapefiles, data is taken from the file with extension `.dbf`.)

- *From a text file.* To import data from a text file, either drag the file from the Finder to the variable table, or choose "Import Data into Layer" from the File menu. It is necessary to choose which map layer will receive the imported data. Supported text formats include:

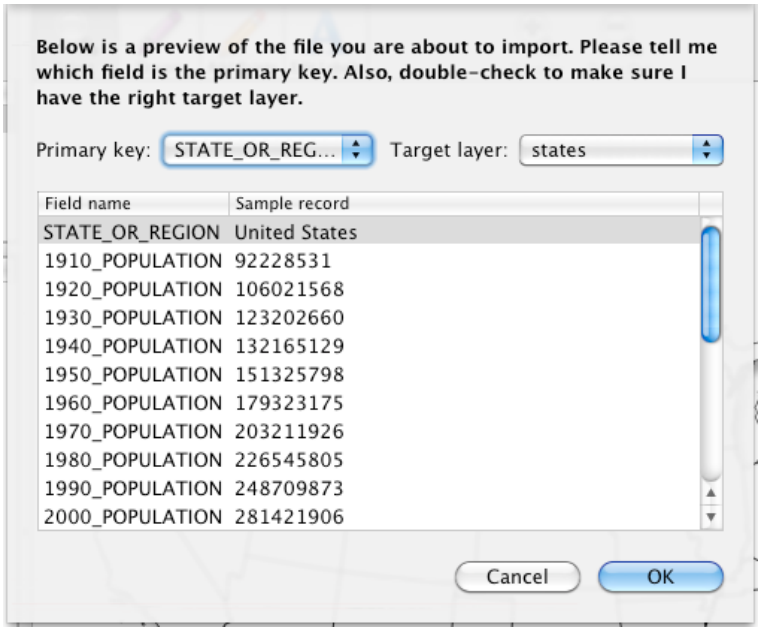
    - CSV (comma-separated-variables)
    - Tab-separated format
    - Right-justified fixed-width format

  In all cases, the first line of the file should contain a header with variable names. If the first line contains any empty fields, it is skipped, and Magic Maps searches the rest of the file for a header line, and imports data on any remaining lines.

- *Copy-paste.* It is possible to copy-paste data directly from a spreadsheet, text editor, or web browser. The first line of the pasted data should contain the variable names. To paste data, first click the map to ensure it will receive the paste, then choose "Paste" from the Edit menu.

In all cases, data is linked to the target map layer using the map layer's primary key. If a header field is present with the same name as the map layer's primary key name (e.g., "FIPS code"), that variable is used to link data to map features. If

there is no header field with the same name as the map layer's primary key, a dialog will appear asking you to identify the column to use for linking:



Choose the column that corresponds to the target layer's primary key and press OK.

For maps that use the U.S. template, the primary key is "state", which can be the state's name, its two-letter postal abbreviation, or its two-digit FIPS code.

Magic Maps supports both time-series and non-time-series data. Data is interpreted as a time series if a "year" column is present in the imported data; in this case, each row corresponds to an annual observation for some map layer feature. Data will also be interpreted as a time series if the columns in the imported data appear to have a year at the beginning or at the end of the variable name. For example, if the imported data has columns for "Population1990" and "Population2000" (or, alternatively, "1990_Population" and "2000_Population"), Magic Maps will create a single variable called "Population" with separate observations for the years 1990 and 2000.

If the imported data has multiple observations for each year and primary key value, the observations will be added together. This feature makes it possible to import and aggregate data that has been sliced by (for example) demographic variables, even though Magic Maps does not have direct support for storing sliced data.

Magic Maps determines whether an imported column is a text field or a data field by attempting to parse each value in the first row of data as a number. If the parsing succeeds, the column is treated as a data field; otherwise, it is treated as a text field.

Magic Maps can parse numbers in decimal format, currency format (e.g. "$2,000"), and scientific notation (e.g. "1.0e6"). The decimal point character is determined by the computer's locale settings.

Adding data manually

It is also possible to add data to a map layer manually. To create a data variable, click the green button below the variable table. When you do, the Text tool will be automatically selected. Click a feature on the map, and a gray text editor will appear. To give that feature a value, type a data value and press Enter. Or, press the Tab key to cycle through to the next feature (features are sorted alphabetically by name).

To create a text variable, first ensure that no variables are currently selected, then select the Text tool. Click any map feature, type to give it a value, and press Enter (or Tab).

The entered values apply to the currently selected year.

Exporting data

The variables associated with each data layer can be exported in two formats: CSV (comma-separated-variables), or DSPL (Data Set Publishing Language). CSV is appropriate for spreadsheets or other data programs; DSPL can be used to upload data sets to the Google Public Data Explorer at www.google.com/publicdata.

To export data from a particular layer, use the "Export Data" sub-menu in the File menu. Alternatively, CSV data can be exported by dragging a set of desired variables from the variable table to the desired location in the Finder.

Geographic data from a data layer can be exported as KML for viewing in Google Earth or other programs; use the "Export KML" sub-menu in the File menu. The KML file will contain the colors visible in the current map view.

Importing points as a layer

A set of points can be imported into Magic Maps much the same way as variable data.

- *From KML files or Shapefiles.* Select “Import KML” or “Import Shapefile” from the File menu, or drag the file from the Finder into the map view.

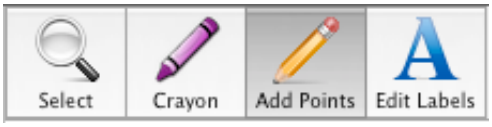
- *From CSV or plain-text files.* Select “Import Points” from the File menu.

- *From spreadsheets or text editors.* Select the Add Points tool, then paste your data directly into the map view.

When importing from a text file or pasting data directly into the map view, the header line should have columns for “latitude” and “longitude.” Other columns will be imported as data variables. As when importing area layers from a KML file or Shapefile, you will have the option to choose columns to treat as each feature’s name and its primary key.

If latitude and longitude are not available to you, it is possible to geocode U.S. city and town names directly in Magic Maps. In this case, the header line should have columns for “city” and “state”; the “state” column should contain the state’s two-letter postal abbreviation. If a row cannot be geocoded, you will be presented with a dialog where you can manually correct the city name, or else enter latitude and longitude explicitly.

Adding points manually



To add points to the map manually, select the Add Points tool and click the desired locations on the map. A new layer called “points” will be automatically created. To delete a point, select it with the Select tool and press the Delete key.

It is not possible to move points in the current version of Magic Maps; you can achieve the same effect by deleting a point and re-adding it.

Creating computed variables

Computed variables are created by selecting one or more variables on the variable table and choosing a command from the Variable menu (this menu can also be accessed by right-clicking the variable table). There is no syntax for entering in formulae; however, complex computations can be built up with a series of computed variables just by repeated use of the Variable menu.

The following functions are available:

- *Percent change* computes the percentage increase or decrease of a variable over the specified time interval.

- *Time difference* computes the absolute increase or decrease of a variable over the specified time interval.

- *Time lag* computes the value in a previous year, as specified by the time interval.

- *Divide* will divide the selected variables by a chosen variable.

- *Scale* multiplies the variable by a specified power of 10.

- *Sum variables* adds the selected variables together.

- *Aggregate* is available only for point data. It computes the sum of the selected variable across all points that lie within each feature of another layer. (For example, the “Aggregate” function could be used to compute total store sales by state.)

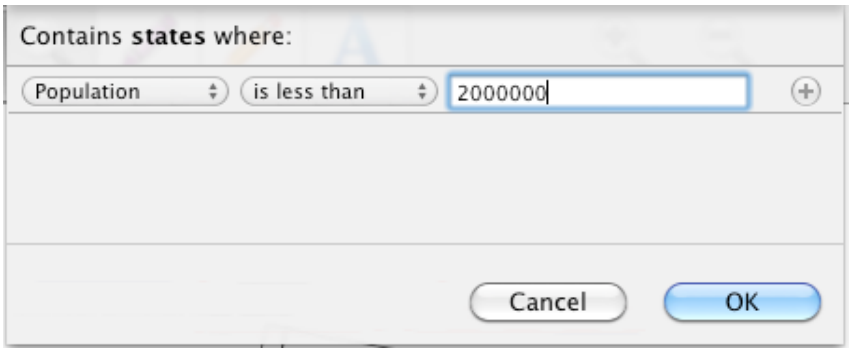
In addition, the Variable menu contains a “Weighted By” sub-menu. The chosen variable is used to compute weighted averages of the selected variables when the variable table is set to display average values.

It is not possible to change the name of computed variables; their names always reflect the computations that they perform.

Smart Layers

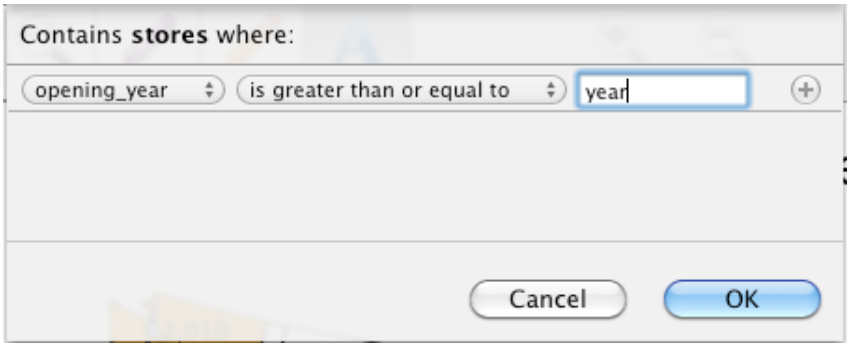
Smart Layers apply custom rules to display a subset of map features from a given layer. To create a Smart Layer, select a map layer and choose “New Smart Layer” from the Layer menu. A dialog will appear with a rule editor that you can

use to define custom rules; for example, the following rule will select states where the population is less than 2,000,000:



Use the + button to define more than one rule for the same Smart Layer.

The Smart Layer rules can compare attributes to a given number, or to the special string “year”; in the latter case, the rule will compare the attribute on the left to the currently selected year. This feature can be used to show openings and closings, for example:



A Smart Layer can be edited later by choosing the “Edit Smart Layer” command from the Layer menu.

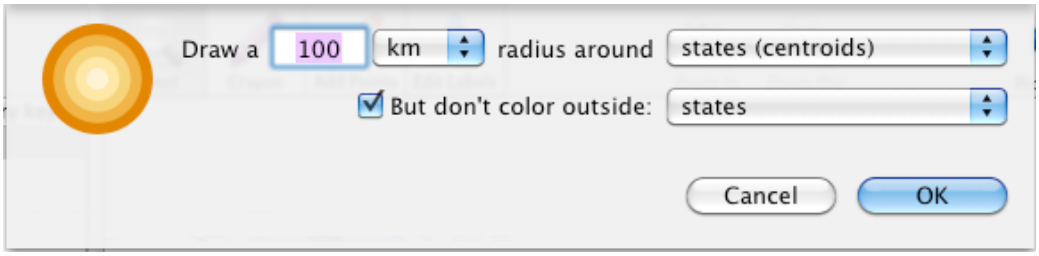
Geographic computations

The Layer menu contains commands for performing distance and point-counting computations.

Draw Blast Radius in the Layer menu creates a radius layer with circles of a specified radius drawn around each feature of a target layer. If the target layer contains areas rather than points, the radius is drawn around each area’s

centroid (the centroid is like a center of gravity; it does not necessarily lie within the feature).

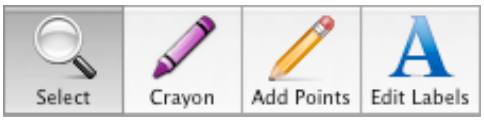
An option is available for restricting the drawn circles to lie within the silhouette of another layer.



Compute Distance in the Layer menu creates a new computed variable that contains the minimum distance (in kilometers) between features in the current layer and any feature in the target layer. If the layer contains areas rather than points, the features' centroids are used for the computation.

Count Points in the Layer menu creates a new computed variable that contains the number of points in the target layer for each feature in the current layer. For a point-counting function that sums a variable of interest, use the "Aggregate" function in the Variable menu.

Select tool



The Select tool can be used to select a subset of features on the currently selected map layer. The variable table and the timeline will display the aggregate values for the current selection.

By default, selected features appear highlighted in light purple. (The selection color can be changed in the Style panel.)

To select a single feature, click it.

To select multiple features, click while holding the Command key.

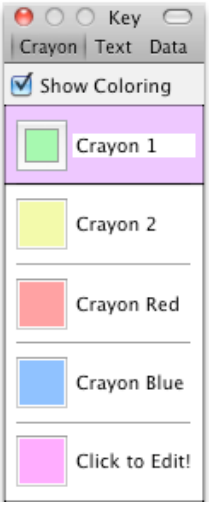
To draw a selection box that selects every feature touching the box, click and drag.

Double-clicking a feature will zoom the map view to that feature.

For maps that use the United States template, you can select every feature within a state by holding the Shift key and clicking a feature within the state of interest.

A selection layer can be created from the current selection by choosing “New Layer from Selection” from the Layer menu.

Crayon tool



The Crayon tool can be used to define regions and compare two or more regions on the Timeline.

Selecting the Crayon tool will bring up the Map Legend with the current palette of colors. The current Crayon color is highlighted in purple.

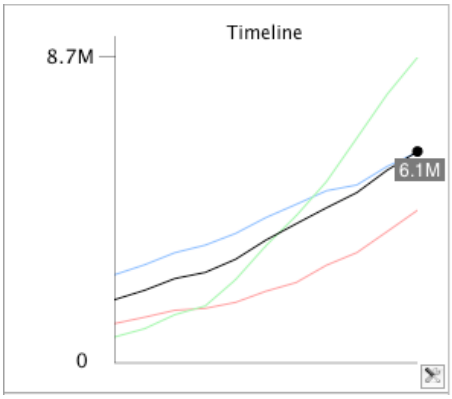
To color a feature with the current Crayon color, click the feature. Click and drag to color multiple features at once.

To remove coloring from features, click them again with the original Crayon used, or select the features and press Delete.

To change the color of the current Crayon, click the color well next to its label. The features colored with this Crayon will be changed as well.

To change the name of any Crayon, click its label, type a new name, and press Enter.

To choose another Crayon for coloring, click it on the Map Legend.

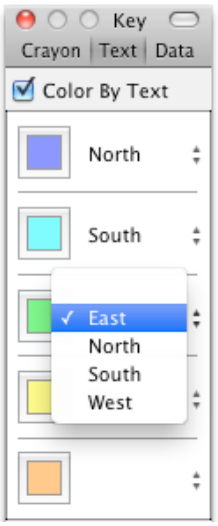


After you have colored in regions, each region's aggregate values will appear on the timeline in the corresponding Crayon colors. (The aggregate values of the current selection still appear in black.)

In this way, it is possible to compare the time series of regions or individual features on the same timeline.

Coloring with data

The Map Legend window can be used to color features on a map layer according to variables of interest. The Map Legend window can be opened by clicking the "Legend" button on the right side of the toolbar, or choosing "Map Legend" from the Inspectors menu.

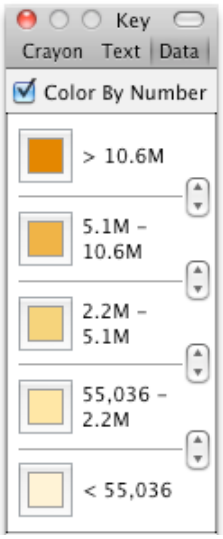


Color by text. To color features according to a text variable, first select the text variable in the variable table. Next, select the "Text" tab in the Map Legend window (see figure at left), and check the box that says "Color By Text".

To find and color features that share a particular value for the selected text variable, select the value of interest from one of the five popup buttons.

You can customize the colors of the text categories by clicking the color well next to each popup button.

Currently, up to five text categories can be defined.



Color by number. To color features according to a numeric variable, first select the data variable in the variable table. Next, select the "Data" tab in the Map Legend window (see figure at left), and check the box that says "Color By Number".

To change the numbers that define each range, use the stepper buttons that appear above and below each category label on the right.

To customize the color of a numeric range, click the color well next to the appropriate range label.

Currently, up to five numeric ranges can be defined.

Top 100 List

A final feature that is useful for data analysis is the "Top 100 List" window, which displays a list of features ranked according to the currently selected variable. The Top 100 List window can be opened by clicking the "Top 100" button on the right side of the toolbar, or by choosing "Top 100 List" from the Inspectors menu.

Selecting rows in the Top 100 List will select the associated features on the map, and selecting features on the map will select the corresponding rows on the Top 100 List.

Double-clicking a row on the Top 100 List will zoom the map to the corresponding feature.

IV. Titles and Labels

Maps can be annotated with titles and labels. Titles and labels have full support for Unicode, and can be styled with custom fonts and colors.

Titles

Titles can be associated with each map layer or with each variable in a map layer.

To give a title to a map layer, ensure that no variables are selected and then click the region in the top center of the map view where a text cursor appears. Type a title and press Enter. The map layer title will appear when that map layer is selected.

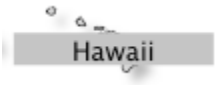
To give a title to a particular variable, select the variable and then click the region in the top center of the map view where a text cursor appears. Type a title and press Enter. The variable title will appear whenever that variable is selected, and takes precedence over the map layer title.

To edit a title, first select the Edit Labels tool, then click the region in the top center of the map view where a text cursor appears. Press Enter when you are finished editing the title.

To change the title's font or color, begin editing the title and then choose "Show Fonts" from the Font menu. Press Enter when you are finished changing the font and color. The title's color can also be changed from the Map Style inspector window, described in the next section.

Labels

In Magic Maps, each label must be associated with a feature of a map layer. All labels are stored as text variables in the variable table.



To create a new set of labels, first ensure that no variables are selected. Then select the Edit Labels tool and click a feature to which you wish to assign a label. A gray text box will appear in which you can type a label. Press Enter when you are finished.

To change the position of a label, click it and drag it to a new position on the map. The label's position will be stored as a point on the Earth's coordinate grid

(if possible), so labels retain their geographic position across changes in the map projection.

If a label is dragged outside the feature that it describes, a leading line will automatically connect the label back to its source. To change the point where the leading line is anchored inside its source feature, drag the label back inside the feature so that the leading line “catches” at a different point.

The chosen position of labels will apply to all variables in the map layer.

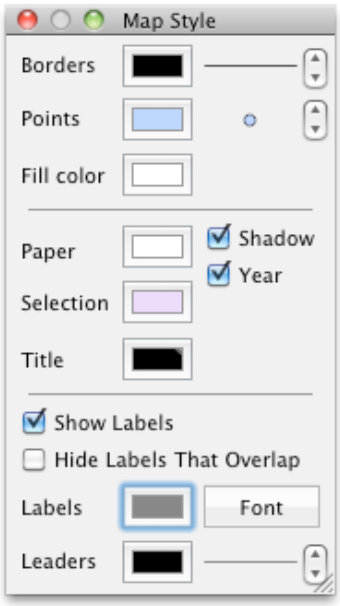
To change the font and color of labels, either use the controls in the Map Style inspector window, described in the next section, or select “Show Fonts” from the Font menu.

V. Style and Projection

A map's appearance can be controlled by changing the map's style as well as its projection.

Map Style window

To change the style of a map layer, open the Map Style window by clicking the "Style" button on the toolbar, or by choosing the "Map Style" item from the Inspectors menu.



The Map Style window contains several controls:

Border color and thickness. The color well determines the color of feature borders, and the thickness stepper determines the thickness of feature borders. For point layers, these controls determine the color and thickness of the rim of drawn circles.

Points color and size. The color well determines the color of points that are not otherwise colored by a Crayon or data category. The size stepper determines the size of points. These controls apply only to point layers.

Fill color. This color well determines the fill color of areas that are not otherwise colored by a Crayon or data category. This control applies only to area layers.

Paper. This color well determines the background color of the map; it applies to all map layers.

Selection. This color well determines the color of selected features.

Title. This color well determines the color of the map's title. (This color is also applied to the year label in the bottom-left of the map, if visible.)

Shadow. If checked, the currently selected map layer will have a drop shadow beneath it.

Year. If checked, the currently selected year will appear in the bottom-left corner of the map.

Show Labels. If checked, text labels will display the value of each feature for the currently selected variable.

Hide Labels That Overlap. If checked, text labels that would overlap with other text labels are hidden in order to increase legibility.

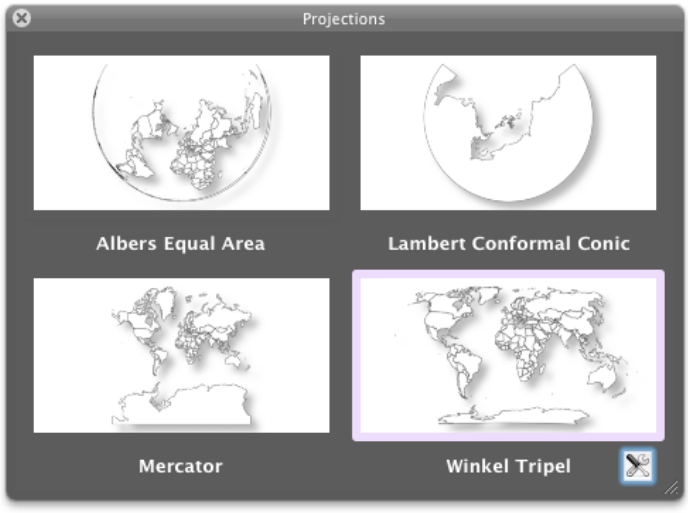
Labels color and font. This color well determines the color of text labels on the map. The font button brings up the Font panel, which can be used to choose the font for text labels.

Leaders. This color well determines the color of leaders (solid lines that connect labels back to their sources). The stepper determines the thickness of leaders.

It is possible to save the current style for future use by choosing “Make Current Style Default” from the File menu.

Map Projections window

A map projection refers to the method of translating points on a sphere (i.e., the Earth) to points on a flat surface (i.e., your computer screen). You can choose one of four map projections by clicking the “Projections” button on the toolbar, or by selecting “Map Projections” from the Inspectors menu.



Albers Equal Area displays features of equal geographic area with equal size.

Lambert Conformal Conic is often used for aeronautical charts.

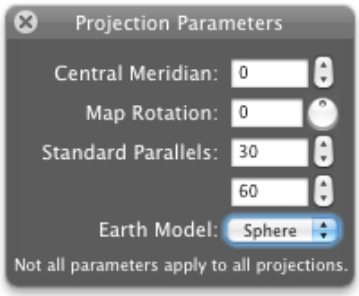
Mercator distorts areas but is a popular choice for world maps.

Winkel Tripel is another popular choice for world maps.

The chosen map projection can be further customized by adjusting the map projection parameters, as described below.

Map Projection Parameters window

The Map Projection Parameters window contains controls for adjusting the mathematical parameters that define each map projection. It can be opened by clicking the Configure button in the bottom-right corner of the Map Projections window, or by selecting “Parameters” from the Inspectors menu.



Central Meridian determines the line of longitude in the middle of the map projection. Values are in degrees relative to Greenwich; negative values are degrees west, and positive values are degrees east. Valid values are between -180 and +180.

Map Rotation is a clockwise rotation applied after the map projection. Valid values, in degrees, range between 0 and 360.

Standard Parallels refer to lines of latitude, but have different meaning based upon the map projection. In general, points close to or between the standard parallels will be projected with the least amount of distortion. Valid values are between -90 (South Pole) and +90 (North Pole).

Earth Model refers to whether the Earth should be treated as a sphere or as an ellipsoid in the projection process. The ellipsoid model is more accurate, but the sphere model is usually computed more quickly.

The following table summarizes which parameters have effect upon which projections:

	Central Meridian	Map Rotation	Standard Parallel 1	Standard Parallel 2	Earth Model
Albers Equal Area	●	●	●	●	●
Lambert Conformal Conic	●	●	●	●	●
Mercator		●			●
Winkel Tripel	●	●	●		

For maps that use the U.S. map template, the parameter changes will apply to the coterminous 48 states, but not to the Alaska or Hawaii map insets.